

Appl. No. 09/832,980
Amdt. dated May 4, 2005
Reply to Office action of February 4, 2005
Atty. Docket No. AP1103US

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1 to 3: Cancelled

4. (Currently amended) A termination circuit as defined in claim [[1]] 19, wherein said ~~communications~~ transmission medium is a twisted copper pair.

5. (Currently amended) A termination circuit as defined in claim [[1]] 19, wherein said bi-directional communication is implemented utilizing a Digital Subscriber Line (DSL) scheme.

Claims 6 to 18: Cancelled

19. (New) A termination circuit for a subscriber line interface connected to a transmission medium for bi-directional communication of both voice and data signals, said termination circuit comprising:

- (i) detection means (106) for detecting voice and data signals at a connection point (131, 132) to said transmission medium and providing corresponding detected voice and data signals (V+D);
- (ii) far end echo cancellation means for deriving from said detected voice and data signals a voice band return loss signal (V'), limiting said voice band return loss signal to the voice band, and combining said voice band return loss signal (V') with voice and data signals for transmission to said transmission medium via said connection point.

20. (New) A termination circuit according to claim 19, further comprising

- (iii) transhybrid loss and near echo cancellation means comprising an analog circuit (118) responsive to data signals to be transmitted via said connection point (131, 132) for providing estimates of a transhybrid component value and a near end echo value, an analog data band filter (119) for restricting the estimates to said data band, and means (120) for subtracting the restricted estimates from incoming signals received from said transmission medium via said connection point.

21. (New) A termination circuit for a subscriber line interface connected to a transmission medium for bi-directional communication of both voice and data signals, said termination circuit

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comprising:

- (i) detection means (106) for detecting voice and data signals at a connection point (131, 132) to said transmission medium and providing corresponding detected voice and data signals; and
- (ii) far end echo cancellation means for deriving from said detected voice and data signals a data band return loss signal, limiting said data band return loss signal to the voice band, and combining said data band return loss signal with voice and data signals for transmission to said transmission medium via said connection point.

22.(New) A termination circuit according to claim 21, further comprising

- (iii) transhybrid loss and near echo cancellation means comprising an analog circuit (118) responsive to data signals to be transmitted via said connection point (131, 132) for providing estimates of a transhybrid loss component value and a near end echo value, an analog data band filter (119) for restricting the estimates to said data band, and means (120) for subtracting the restricted estimates from incoming signals received from said transmission medium via said connection point.

23.(New) A termination circuit for a subscriber line interface connected to a transmission medium for bi-directional communication of both voice and data signals, said termination circuit comprising:

- (i) detection means (106) for detecting voice and data signals at a connection point (131, 132) to said transmission medium and providing corresponding detected voice and data signals (V+D);
- (ii) far end echo cancellation means responsive to said detected voice and data signals for providing a voice band return loss signal and a data band return loss signal, limiting said data band return loss signal and voice band return loss signal to the data band and the voice band, respectively, and combining the voice band return loss signal and data band return loss signal with voice and data signals for transmission to said transmission medium via said connection point.

24.(New) A termination circuit according to claim 23, further comprising

- (iii) transhybrid loss and near echo cancellation means comprising an analog circuit (118) responsive to data signals to be transmitted to said transmission medium via said connection point (131, 132) for estimating a transhybrid loss component value and a near end echo value, an analog data band filter (119) for restricting the estimates to said data band, and

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means (120) for subtracting the restricted estimates from incoming signals received from said transmission medium via said connection point.

25. (New) A termination circuit as defined in claim 20, having an analog to digital converter for digitizing said incoming data signal after said transhybrid component and near end echo have been cancelled.

26. (New) A termination circuit as defined in claim 25, having a voice band filter and a data band filter to receive said incoming data signal, and to separate said incoming signals into separate voice band and data band signals for processing by separate analog to digital converters.

27. (New) A termination circuit as defined in claim 25, having means for separating said incoming signals into separate voice band and data band signals, independently scaling the voice band signal and said data band signal and adding the scaled signals prior to processing by said analog to digital converter.

28. (New) A termination circuit as defined in claim 25, having a voice band filter and a data band filter to receive said incoming signal, and to separate said incoming signal into separate voice band and data band signals, scaling means to scale each of said separated voice and data signals, and means to add said scaled voice and data band signals into a combined signal prior to processing by said analog to digital converter.

29. (New) A method of terminating a subscriber line interface connected to a transmission medium for bi-directional communication of both voice and data signals, comprising the steps of:

- (i) detecting voice and data signals at a connection point (131, 132) to said transmission medium and providing corresponding detected voice and data signals;
- (ii) cancelling far end echo by deriving from said detected voice and data signals a voice band return loss signal, filtering to limit said voice band return loss signal to the voice band, and combining the filtered voice band return loss signal with voice and data signals for transmission to said transmission medium via said connection point.

30. (New) A method according to claim 29, further comprising the step of

- (iii) cancelling transhybrid loss and near echo cancellation by deriving from data signals to be transmitted via said connection point (131, 132) estimates of a transhybrid loss component

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value and a near end echo value, and, using analog filtering, limiting the estimates to said data band, and subtracting the restricted estimates from data signals received from said transmission medium via said connection point.

31.(New) A method of terminating a subscriber line interface connected to a transmission medium for bi-directional communication of both voice and data signals, comprising the steps of:

- (i) detecting voice and data signals at a connection point (131, 132) to said transmission medium and providing corresponding detected voice and data signals; and
- (ii) cancelling far end echo by deriving from said detected voice and data signals a data band return loss signal, filtering to limit said data band return loss signal to the data band, and combining the filtered data band return loss signal with voice and data signals for transmission to said transmission medium via said connection point..

32.(New) A method according to claim 31, further comprising

- (iii) cancelling transhybrid loss and near echo cancellation by deriving from data signals to be transmitted via said connection point (131, 132) estimates of a transhybrid loss component value and a near end echo value, and, using analog filtering, limiting the estimates to said data band, and subtracting the restricted estimates from data signals received from said transmission medium via said connection point.

33.(New) A method of terminating a subscriber line interface connected to a transmission medium for bi-directional communication of both voice and data signals, comprising the steps of:

- (i) detecting voice and data signals at a connection point (131, 132) to said transmission medium and providing corresponding detected voice and data signals;
- (ii) cancelling far end echo by deriving from said detected voice and data signals a voice band return loss signal and a data band return loss signal, filtering to limit said voice band return loss signal to the voice band and said data band return loss signal to the data band, and combining the filtered voice band return loss signal and the data band return loss signal with voice and data signals for transmission to said transmission medium via said connection point.

34.(New) A method according to claim 33, further comprising

- (iii) cancelling transhybrid loss and near echo cancellation by deriving from data signals to be transmitted via said connection point (131, 132) estimates of a transhybrid loss component value and a near end echo value, and, using analog filtering, limiting the estimates to said

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data band, and subtracting the restricted estimates from data signals received from said transmission medium via said connection point.

35. (New) The method of claim 34, further comprising the step of providing an analog to digital converter for digitizing said voice and data band signals after said transhybrid component and near end echo have been cancelled.

36. (New) The method of claim 35, wherein said incoming signal after cancellation of transhybrid components and near end echo is separated into voice band and data band signals utilizing a voice band filter and a data band filter, respectively, and digitized by separate analog to digital converters.

37. (New) The method of claim 35, wherein said incoming signal after cancellation of transhybrid components and near end echo is separated into voice band and data band signals, scaled as separate signals, added together to form a composite signal and digitized in an analog to digital converter.

38. (New) The method of claim 35, wherein said incoming signal after cancellation of transhybrid components and near end echo is separated into voice band and data band signals utilizing a voice band filter and a data band filter, respectively, said separate signals being scaled and added together as a scaled composite signal and digitized by an analog to digital converter.